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EDITORIAL.

Literary Style in Technical Writings.

The desirability of attention to the literary side of technical writing, for the purpose of embodying a good literary style in the preparation of reports, papers and books on engineering subjects, has been noted more than once in our columns, and we have remarked upon the fact that in this respect American technical writers (taken as a whole) are distinctly behind those of European countries. This may be due in part to differences in national character and temperament, and in the educational systems. But we believe that it is due in much larger part to a general neglect of, and perhaps even a certain underlying contempt for, the niceties of a liberal or literary education in this country. The student is apt to aim much more at acquiring facts and general knowledge than at acquiring the ability to arrange and correlate his facts mentally, and to present them in an orderly, convincing and pleasing manner when committing them to paper.

The same applies to the writers of technical books and reports, who (speaking generally, of course) appear to think that the acquisition of literary style in the expression of their thoughts or the presentation of their knowledge is a very secondary matter, if not, indeed, unnecessary. They appear to have, in fact but a scant appreciation of the influence of literary style in its relation to the value of the report or book. As a matter of fact, this influence may be very important. The evidence of an ability to arrange subjects systematically and to present information and opinions in a style and language which will be not only clear but pleasing, necessarily have some influence in convincing the reader as to the value of the writing and the ability of the writer. A literary style does not mean flowery language or verbosity. It tends rather to simplicity, directness and conciseness. It includes also correct grammatical expression and good "diction" or choice of language, so that the meaning is clear and not involved or ambiguous and is also presented in a pleasantly readable style. Such "style" can be appreciated better than it can be explained.

The above remarks have been suggested by a perusal of the numerous papers prepared by foreign and American engineers and railway officers for the recent meeting of the International Railway Congress. Many of the foreign papers have a style of composition and a facility of expression which render them distinctively "live" and readable, rather than mere dry-as-dust technical treatises. On the other hand, some of the American contributors must impress their foreign readers with a rather low opinion of the literary ability of the writers. It is also probable that with this opinion will go (perhaps involuntarily) a somewhat low opinion of the technical ability which presents its information in a bald and unattractive manner, as though it was not thought worth while to pay much attention to the preparation of the paper.

There is a difference, also, in the general treatment of the subject in these papers, in addition to the difference in literary character. Some of the American papers are mere presentations of the practice of a number of individual railways in regard to certain specific points, with little or no discussion or analysis of the subject, and without explanation as to whether the practice in each case is good or representative. Some of them, indeed, are little more than the stringing together of the replies of different railways to a list of questions. The European writers in treating the same subjects show evidence of much more individual thought and personal work. Their papers are more in the nature of condensed treatises or broad reviews, treating the subject comprehensively, discussing and analyzing its various aspects and relations, and using information as to individual practice mainly to illustrate the various matters treated. In other words, the description of individual practice is subordinate to the general treatment of the subject as a whole. These papers might be widely read with advantage in this country, not only for the information that is in them but also (and especially) for their educational influence in a literary direction.

In the preparation of engineering reports there is an additional and very important reason for grammatical accuracy, clearness of language and definiteness of statement, which factors go far in giving literary merit. This reason is that the report is liable to discussion and criticism, perhaps friendly but perhaps hostile. When an engineer makes a report, his employer wants to be able to understand what it says and to comprehend what it means. If the language is involved, and especially if its meaning is obscure or ambiguous, there may result considerable unnecessary discussion or controversy, due entirely to the style of the report. If the matter is one which relates to litigation or comes before a court, an ill-prepared report may offer many points of attack for the opposing counsel. In such cases, the engineer himself may be confused and discredited before a jury or an arbitrator (and his case discredited also) in an examination as to what he means and what the report says in certain awkwardly-worded phrases or sentences. Literary style, therefore, is desirable not only for its educational influence (upon both author and reader) but also for its practical learning upon commercial and professional affairs.

REVIEWS.

Steel for High-Speed Tools.

Reviewed by JOHN A. MATHEWS.*

HIGH-SPEED STEEL.—The Development, Nature, Treatment, and Use of High-Speed Steels, Together with Some Suggestions as to the Problems Involved in Their Use. By O. M. Becker, Industrial Engineer. New York: McGraw-Hill Book Co. Cloth; 6¼ x 9½ ins.; pp. 360; 271 text illustrations; tables and appendixes. $4, net.

This work will be welcomed by a host of users of the modern tool steels and will be widely used as a book of reference, and possibly as a text-book. It so abounds in good ideas and helpful suggestions that it might not be amiss in this day of federal and legislative interference in private affairs to have it made a law that anyone entrusted with the treatment and use of high-speed steel should first pass an examination and show himself a master of the contents of Mr. Becker's book.

The author writes in a direct and interesting style that can be understood by every reader. The work is not extremely technical, nor does it abound in theories. It deals mainly with cold facts, handled entertainingly and plainly by a man who seems to have a comprehensive grasp of his subject.

It is a more profitable task to outline the scope and thoroughness of this book than it is to point out minor defects or to argue points of difference of opinion. The reviewer prefers rather to give an idea of the pleasure and profit in store for the buyer or user of high-speed steels who studies this volume.

Of the five sections into which the book is divided the first deals with early tool steels and the historic sequence of the steel-making processes down to the present day. In chapter two of this section is recounted Robert Mushet's discovery; the other self-hardening steels which followed; the experiments of Messrs. Taylor and White on high-heat treatments; the transtion from high-carbon self-hardening steels to the relatively low-carbon high-speed steels of only ten year's standing. Chapter three discusses the nature and characteristics of the new steels together with a display of typical analyses of carbon, self-hardening and high speed steels; their constitution, microstructure, theory of hardening, and significance of recalescense temperatures. Mr. Becker calls attention to the disposition on the part of both user and maker to employ one steel for all purposes. While a universal steel is possibly much to be desired and some modern high-speed steels are extraordinarily adaptable to a wide range of uses, yet Mr. Becker truly remarks that for the most part they are adaptable to particular rather than to universal service. He thus emphasizes a thought the reviewer tried to bring out several years ago in discussing Mr. Gledhill's paper before the Iron & Steel Institute, in which he stated his belief that some day we should know enough about high-speed steels to recognize different grades of them and to apply them just as we use different carbons or "tempers" for punches, dies, drills, razors, etc. A very few users and a very few makers have advanced sufficiently to prove the truth of this prediction.

The "new" and "improved" high-speed steels are discussed, but the author does not seem inclined to give them as much credit as is due them. To be sure they have not come up to the claims of a well-known English metallurgical authority nor are they as "new" as he would have us believe. The writer of this review, together with one or two others in this country, produced these so-called "new" steels about seven years ago, and since high-speed steel is of but little more than ten years' standing, the claims made by foreign steel makers early in 1909 are ludicrous, but the joke is really on the American buyers who paid extraordinary prices for the "new" steels in 1909, when the same thing had been a staple American product for at least four years prior to that time, and offered to them at prices that were fair and reasonable. However, you can "fool all of the people some of the time."

The so-called "new" steels described abroad in 1909, owe their superiority to the use of vanadium but this fact was not disclosed by the "press agent." Almost simultaneously with the announcement of these wonderful steels another British scientist took a look at a piece of vanadium high-speed steel under the microscope and solemnly asserted that vanadium is not a useful addition to chrome-tungsten steels of this type, and all this after its use had been a commercial success in America for at least seven years and after Mr. Fred. Taylor had published his splendid paper on "The Art of Cutting Metals," in which he showed that the best cutting steels he had used contained a considerable amount of vanadium.

In Section II., the author deals with "Making the Steel and Tools" and discusses at length the manufacture of high-speed steel, forging, hardening, tempering, annealing and grinding. He makes a strong plea for accurate, scientific methods in connection with each operation. He includes an excellent chapter on determining and regulating temperatures in high-speed treatment, in which are described and illustrated different systems of pyrometry. Furnaces and heating methods are fully dealt with and an entire chapter is devoted to the barium chloride method of heating, which the author highly commends. He does not discuss the

*Operating Manager, Halcomb Steel Co., Syracuse, N. Y.

causes of failure which so many have experienced in attempting to use this method.

Section III. deals with "The Tool at Work." Chapters are included on the range of utility of high-speed steel, conditions of maximum effect, speeds, feeds and related matters. In this section the author very wisely follows the lines laid down by Taylor.

Section IV. deals with "The New Requirements." In it is discussed the fundamental considerations in the design of new tools, the new machine requirements, and remodeling an old equipment.

Section V. treats of the problems involved in the use of high-speed steels. Here we find questions of productive costs by the old and new way compared, and the great economies resulting from the use of the new steels are shown. The closing chapter refers to the matter of tests and the scope of profitable experimentation. These are so often inconclusive that a chapter on the subject is most welcome. The tremendous loss during the past ten years, of time, money and materials to both the steel maker and the customer calls for just such information as is here given.

The author has produced a work that should literally be among the "best sellers" of the year. He is apparently a man of high ideals and strongly urges accurate and precise methods. His constant plea for good furnaces, good pyrometers, good grinding facilities and scientific methods throughout the tool room and machine shop deserves well to be heeded. Every shop using high-speed steels, every technical and industrial school professing to give instruction in metal working and every industrial library should have this splendid volume. To its author is due high praise from the engineering profession.

A Revised Edition of Folwell's Sewerage.

SEWERAGE.—The Designing, Construction, and Maintenance of Sewerage Systems. By A. Prescott Folwell, M. Am. Soc. C. E., Editor "Municipal Journal and Engineer." Sixth edition, revised and enlarged. New York: John Wiley & Sons. London, England: Chapman & Hall, Ltd. Cloth; 6 × 9¼ ins.; pp. 506; 12 plates and 46 illustrations. $3; English price, 12s. 6d., net.

It speaks well for a book on so special a topic as sewerage that a thousand copies a year should have been called for as an average during the dozen years since the first edition appeared. The demand for the volume before us, we presume, has been largely due to the fact that it was designed to serve the purpose of both the engineer in practice and the engineering professor and student in schools. Considering the space limits of the volume, this double purpose seems to have been well fulfilled. The author has found it necessary, however, to enlarge considerably upon the original edition. Thus a reference to our review of the first edition (Eng. News, Dec. 15, 1898) shows that the book originally had about 375 pages, and that the third edition (Eng. News, Nov. 8, 1900) included 435 pages; the fourth edition (Eng. News, Aug. 1, 1901) 445 pages, while the book as it stands after its latest revision has over 500 pages. The number of illustrations meanwhile has also been materially increased.

In his preface to the present edition, the author states that there have been few changes in the principles of sewer design and construction since the appearance of the first edition, and that the most important of such changes as have taken place relate to the increasing use of concrete. So far as sewerage, as distinct from sewage disposal, is concerned, it appears that the author has not attempted many changes in the present edition, although it has been his evident endeavor to bring the book up to date wherever revision was necessary.

The first edition contained scarcely anything on the treatment of sewage. At that time the author appears to have thought that the subject of sewage treatment was sufficiently covered in books devoted especially to that matter. Subsequently, it appeared to the author desirable to add an extensive section on sewage treatment, and therefore in the third edition 60 pages were devoted to that subject. Since 1900, sewage treatment has become so common a requirement that the author has found it desirable in the present edition to double the space given to sewage treatment as compared with the third edition.

In our review of the first edition, we gave a brief characterization of the work which, save for the new matter on sewage treatment, is generally applicable to the book as it now stands. We therefore quote two short paragraphs from our first review:

> The volume is divided into three parts: (1) "Designing"; (2) "Construction"; (3) "Maintenance." The last two divisions are intended to be practical, as they should be, and they are very satisfactory in this respect. They give the impression of having been written by a person recently connected with actual works, who has at the same time noted the experience of others. The accompanying sketches aid greatly in giving a clear idea of the methods described.
>
> Regarding the book as a whole, it may be said that it is a comprehensive presentation of the subject, well up to date, written in a clear, logical and attractive style. Two praiseworthy features noted at various points are good judgment in weighing evidence and an absence of crochets and hobbies. We are glad to see that the book has an index, and one that is well above the average.

A few seeming omissions or too brief treatment of special topics in the first edition, to which notice was drawn in our first review, have been given attention by the author since that time. We note, however, that it is still true that only some five pages are given to sewage pumping machinery. These, it may be added, are for the most part quite general in their character. There is perhaps still some excuse, as we noted in our first review, for this brief treatment of sewage pumping machinery, for relatively few American municipalities have yet found it necessary to pump their sewage.

Although the author, in his preface to the present edition, mentions the increasing use of concrete, and leads one to infer that the present edition contains considerable additional matter on this subject, yet the sum total of space given to concrete is still not very large, and not as much is said regarding reinforced concrete as some might expect. This cannot be considered as a very serious defect, if a defect at all, in view of the large number of books on concrete, plain and reinforced, which are now being almost thrust upon the engineer on every hand.

In glancing over the pages of the present edition, one's eye occasionally strikes a table or a portion of a discussion which seems to have been retained without change from the very first edition, but which might have been changed with advantage to the purchaser of the book. Perhaps one of the most notable examples of this sort is the table on page 15 giving water consumption in a number of cities by U. S. Census years, but ending with 1890. There have been some notable changes in the water consumption of these cities in the past twenty years. In general, perhaps it is safe to say that the water consumption of the larger cities of the country has materially increased since that time, but there have been some notable reductions, as at Detroit. It is true that recent figures of water consumption are not readily available, but it does not seem as though it would have been very difficult to have brought the table in question sufficiently up to date to have shown the material changes that have taken place since 1890. Even a foot note to the table might have served to indicate the changes of the past 20 years.

The portion of the present edition devoted to sewage disposal gives a good general idea of the present status of the subject, and altogether is about as good as could be expected in the available space. Nor would we suggest that more space be given to sewage treatment in a book of this size.

We are pleased to note that the author gives proper warning against expecting profit from sewage purification works. He states that he has never learned of out-and-out profit having been made in this way, but he gives figures for Pasadena, Cal., which seem to be in disagreement with this statement, even though they are qualified by a reference to the irrigation value of the sewage. These figures on their face show receipts from the Pasadena sewage farm in excess of expenses, but the author fails to call attention to the fact that the original reports of the city (from which presumably his figures are taken, either directly or indirectly) do not make allowance for capital charges. We understand that the city authorities of Pasadena feel that they can ignore interest and sinking fund charges on their sewage farm, in view of the great increase in value of land since that section since the farm was bought. We do not dispute the increase in land values, but however great they may be they do not justify sloppy municipal bookkeeping. If the value of the land occupied by the Pasadena sewage farm has multiplied several times in value, there is a way of showing that fact properly in the municipal accounts, just as there is a way of properly showing the actual charges for interest and sinking fund. Of course, Mr. Folwell is not responsible for Pasadena's poor bookkeeping, but he might well have called attention to the misleading character of the figures which he cited here.

The only other recent books with which the one under review is properly comparable are the two by Prof. Henry N. Ogden on sewage design and construction, respectively, and the bulky two-volume British work entitled "Sanitary Engineering," by Col. E. C. S. Moore. Prof. Ogden's volumes have the advantage of having been written at a more recent date than the original edition of Mr. Folwell's book, and they perhaps give more of the detailed information needed by practicing engineers engaged in sewer design and construction. The latter might be expected since two volumes instead of one are available for the purpose. The British work mentioned, although chiefly devoted to sewerage, covers some other subjects as well and includes a large number of tables. This book may be just the sort of a book that British engineers wish, but it is hardly suited to American needs, and is, of course, very expensive as compared with the volume before us ($14 as compared with $3).

Finally, it may be said that Mr. Folwell's "Sewerage" as it now stands is the only single volume work in which all phases of sewerage design, construction and maintenance, as well as sewage treatment, are treated, and that in addition the volume deserves commendation as a comprehensive survey of the whole field indicated, brought within reasonably small compass.

INTERNATIONAL ASSOCIATION FOR TESTING MATERIALS.—Review of the Fifth Congress, held in Copenhagen, Sept. 7-10, 1909. Part I.: Reports Laid before the Congress. Part II.: Discussions in Congress. By-Laws and Members' List of the Association. New York: McGraw-Hill Book Co. London, England: E. & F. N. Spon, Ltd. Cloth; 6 × 9 ins.; numerous plates and text illustrations. $5; English price, £1.

The fifth triennial congress of the International Association for Testing Materials was held in Copenhagen, Denmark, in September, 1909. Some 900 members from all parts of the world were present and nearly a hundred papers and reports were presented in the five days over which the actual meeting extended. Necessarily, such a voluminous set of papers could not be assimilated by the members in attendance nor could they be satisfactorily abstracted by the technical press at the time of the meeting. The only means, then, by which the enormous work of the contributing members could be made available to the profession the world over was by the publication of a practically verbatim report. This publication is the one noted in the headpiece above.

In addition to a report of the business sessions, reduced to a practical abstract, and a very full reprint of the technical discussions, the book contains in full 36 papers on the metals, 36 papers on cements, concrete and stone, 1 paper on oils, 3 papers on rubber, 1 on timber, 4 on paints for metals and 1 on paper, all concerned primarily with the testing of these materials, but necessarily branching off in many cases to matters of structure and composition. Practically all of the papers are in English, translated from the original in most cases, for the continental contributors far outnumbered those from America and England, but a few are in the original French and German. They embrace all of the papers presented to the Congress, except nine in foreign tongues which will be published as a supplement. Finally the book contains a list of the members classified by their countries.

The variety and volume of the papers prevents specific criticism upon any one of them. Suffice it to say that in no other publication is the present status of testing materials as practiced on the continent of Europe so explicitly set forth as in this report. When the next Congress meets in the United States in 1912, it is probable that the American testing engineers will take a more prominent part in the proceedings.

The Development of Aids to Efficient Production.

FACTORY ORGANIZATION AND ADMINISTRATION.—By Hugo Diemer, M. E., Professor of Industrial Engineering, Pennsylvania State College. New York: McGraw-Hill Book Co., Cloth; 6¼ × 9¾ ins.; pp. 317, 150 text illustrations. $3, net.

This book will be of immediate and practical value to overworked superintendents and managers struggling to reduce the cost of production and to meet the demands of directors who see the greater success of rival concerns. The book will be of service, no doubt, in interesting technically educated apprentices in the manufacturing industries to take up the study of "industrial engineering," so that the growing demand for properly educated and trained managers may be filled, with resultant general progress in manufacture everywhere. A careful reading of this book will repay any engineer who feels that the operations of the concern he may be associated with are bound up in endless "red tape" the utility of which is beyond his mental grasp. He will get a view of the need for routines and formalities, for certain requisitions, receipts and data sheets which, perhaps, now tax his patience and hamper his actions. This book may lead him to a sound opinion of whether or not the objectionable features should be eliminated, and may give him a real basis of criticism or a complacent acceptance of the burden.

The scope of the ideas is broad, the arrangement is logical and the discussions are often quite absorbing. The expression is clear and vigorous—so vigorous at rare intervals as to embody slang, as for instance, when the author utters this truism:

> Cooperation must be honest. There must be no wishy-washy, namby-pambyism. A lot of rah-rahing at a company ball game is no sign that employees don't laugh up their sleeves at insincere patronizing.

The book starts with a brief account of the rise of "industrial engineering," by which is meant the rational application of scientific knowledge and of engineering and economic principles to the commercial production of any manufactured article. It shows in a few words the inadequacy of a man, versed merely in one or two of several branches like selling, purchasing, financial manipulation, handling labor, mechanical engineering, etc., etc., for controlling the internal operations of a manufacturing plant. The book beyond this introduction discusses the various and important ideas that should predominate in the organization and operation of a highly efficient producing plant. These ideas are given in much the order one would expect they would be used in building up a new business. First is an outline of the economies of factory location and arrangement, including a discussion of the selection of structures to fit the operations and of the sort of cooperation that must prevail between the structural designer and those familiar with the processes of the industry to be housed.

This carries the reader through only three chapters; the rest of the 26 may be best described in a word as appertaining to the arts of organization and administration.

The first chapter of the section on the economies of location, arrangement, etc., is a discussion of the effect of the variables, "market," "labor," "materials," and "transportation." Naturally any such discussion not relating to some one very specific case must be general almost to the point of indefiniteness. At the close of this first chapter the author states:

> It is possible that the era of combination may be followed by just as rational a period of decentralization. There are too many intermediary agencies that raise the cost of production and distribution, to make the centralization and combination of all factories an economic desideratum. There is a legitimate, most economic territory, and a corresponding maximum capacity for economic production, that point towards distributed production as an ultimate condition, even with centralized capitalization.

Here is an idea that is working out in many important industrial organizations like, for instance, the ramified General Electric Co., of Schenectady, Pittsfield, Harrison and elsewhere. The economies of the idea are so little known and have been so little discussed that the author would have still more increased the value of his book, for the class of student readers noted at the outset of this review, had this single remark been expanded.

In the economics of buildings, the proposition is advanced that

> it is desirable to construct that type of building which will result in least total sum of combined interest, depreciation and issuance.

This is qualified later by such statements as are reprinted below and with which all progressive managers are in hearty agreement.

> In designing a building it must be borne in mind that, while it must be so planned as to place to greatest advantage the machinery of manufacture, there will always be a great deal of work that depends upon human attendance and that it is just as important that the human machinery be provided with such surroundings and arrangements as will make it the most efficacious. Such arrangements are too often looked upon as philanthropic or advertising measures, when in fact they are part of the production equipment. . . . Poor air and insufficient light and warmth inevitably result in poor work. . . . Agreeable and healthful surroundings will tend more than anything else to remove the chief cause, next to lack of proper and sufficient vital supplies, which is responsible for diminished labor efficiency, namely, discontent. Hence it becomes important to consider what features of building construction influence comfort.

The author dwells on the need of a thoroughly good heating and ventilating system, even stating that the system should always be planned by a competent engineer. The need of good artificial and natural light is commented on, but the author is not happy in his treatment of this little subject; for instance, his requirement "for delicate work" is merely the use of tipless incandescent electric bulbs which avoid streaks. Much good advice might have been given to workmen and works managers had the author rammed home a demand that the illumination scheme of every important plant should be planned by a competent engineer, just as in the analogous, but less important case of the heating.

When it comes to the organization of the staff and departments and to the delegation of authority and responsibility, good use is made of the now fairly familiar charts which facilitate a good grasp of conditions which should prevail. The need and the use for a harmonious expert staff or works board will be granted by the most old-fashioned managers, we should think, after reading the book this far.

The author devotes a whole chapter to departmental reports, outlining the benefit to be gained by the heads of the departments reporting and by the general officers of the concern. What ground the reports should cover and how is discussed. Then the work of the general office department is outlined—the caring for correspondence, the handling of telephone connections and reception of callers. The operations following the receipt of an order are traced in logical order,—the recording of orders by the "order department," the preparation of bills of material needed by a "material department," the designing of new parts and the issue of drawings for parts already designed by the drafting rooms, the fabrication and storage of patterns for castings by the pattern department, the requests for orders for purchased articles and for parts made in the shop and kept in stock to facilitate quick assembly and shipment. Innumerable forms are reproduced, showing desirable records, requests,

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By Myron H. Lewis C. E. This is a concise treatise of the principles and methods employed in the manufacture and use of cement in all classes of modern works. The author has brought together in this work, all the salient matter of interest to the user of concrete and its many diversified products. The matter is presented in logical and systematic order, clearly written, fully illustrated and free from involved mathematics. Everything of value to the concrete user is given. Among the chapters contained in the book are: I. Historical Development of the Uses of Cement and Concrete. II. Glossary of Terms employed in Cement and Concrete work. III. Kinds of Cement employed in Construction. IV. Limes, ordinary and Hydraulic. V. Lime Plasters. VI. Natural Cements. VII. Portland Cement. VIII. Inspection and Testing. IX. Adulteration; or Foreign Substances in Cement. X. Sand, Gravel, and Broken Stone. XI. Mortar. XII. Grout. XIII. Concrete (Plain). XIV. Concrete (Reinforced). XV. Methods and Kinds of Reinforcements. XVI. Forms for Plain and Reinforced Concrete. XVII. Concrete Blocks. XVIII. Artificial Stone. XIX. Concrete Tiles. XX. Concrete Pipes and Conduits. XXI. Concrete Piles. XXII. Concrete Buildings. XXIII. Concrete in Water Works. XXIV. Concrete in Sewer Works. XXV. Concrete in Highway Construction. XXVI. Concrete Retaining Walls. XXVII. Concrete Arches and Abutments. XXVIII. Concrete in Subway and Tunnels. XXIX. Concrete in Bridge Work. XXX. Concrete in Docks and Wharves. XXXI. Concrete Construction Under Water. XXXII. Concrete on the Farm. XXXIII. Concrete Chimneys. XXXIV. Concrete for Ornamentation. XXXV. Concrete Mausoleums and Miscellaneous Uses. XXXVI. Inspection for Concrete Work. XXXVII. Waterproofing Concrete Work. XXXVIII. Coloring and Painting Concrete Work. XXXIX. Method for Finishing Concrete Surfaces. XL. Specifications and Estimates for Concrete Work. (*Ready in October*, 1910). Price.....$2.50

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bills of material, time cards, tags, accounts, etc. All of this seems at first glance (and after several glances to the unappreciative reader) as a lot of "red tape." Study discloses, however, that it is a workable mechanism; the multitude of departmental functions does not involve a heavy personnel for, unless the industry be large, one man carries the functions of several departments. The idea the author develops is the recognition of the distinct functions which must not become confused if knowledge of the progress of work and efficiency of production are to be secured.

The author pauses here to describe the possibilites in a "production department." This is a detached organization for the best distribution of all orders, though coming from the order department, for tracing the progress of work on each order and following up actual construction to expedite progress of some items.

Systems for facilitatng work in various parts of the shop are shown by the author's description of foundry, machine-shop, tool-room, shipping and receiving-department organizations. These specific discussions naturally appear rather involved and the utility of the formalities are grasped only by careful study of the text and by comparisons with foregoing chapters. In one chapter several systems of time taking are described. These vary from mere records of a clock, registering the arrival and departure of the workmen, to the various machine stamps for accurately recording the time spent on each single job allotted to the workman.

From here to the close of the book the treatment begins to broaden, as the usefulnes of a cost departmet, methods for inventories, inspection of materials and product, labor problems, apprentices, etc., are taken up. In the chapter on cost departments, the ways in which accurate data on cost of production have been secured and the service of such knowledge in meeting competition are the main topics, but the author does not fail to emphasize the need for close and appreciative cooperation between the cost keeping and general accounting forces. In the three chapters discussing labor problems, will be found suggestive remarks on workmen's records, on the comparative merits of the several wage systems, and on the difficulties to be overcome in fixing piece-work rates.

The discussion of what an apprentice course in general should aim to do is on a high plane. Definiteness is given by outlining the courses of the Baldwin Locomotive Works and those of the Westinghouse companies about Pittsburg.

The final chapter is entitled "A Bibliography of Works Management." It is not a bare catalog of books and articles but is an analysis of the best literature directly bearing on the subject. A list of collateral reading on industrial history, finance, banking, accounting, economics, organization, trade unions, railways, statistcs and law, is appended.

Street Railway Statistics.

STREET AND ELECTRIC RAILWAYS, 1907.—Special Reports, Bureau of The Census, E. Dana Durand, Director. Washington, D. C.: Pub. Doc. Cloth; 9 x 11⅛ ins.; pp. 575.

AMERICAN STREET RAILWAY INVESTMENTS.—The Electric Railway Red Book. A Manual of the Securities, Traffic Statistics, Earnings, Officers, Directors, and equipment of Street and Interurban Railways of the United States, Canada, Cuba and West Indies. Annual Number. By Frederic Nicholas, Associate Editor "Electric Railway Journal." New York: McGraw Publishing Co. Cloth; 9¼ x 13 ins.; pp. 490; 37 maps.

This census report covers 945 street and electric railways in this country during 1907, including those operated by animal, cable, gasoline or steam power, as well as by electricity. For the study of the data collected, there have been several classifications and the results of studies of classified groups are given in great detail as in previous similar five-year reports. First there is the following grouping: (1) operating companies, (2) non-operating lessor companies, (3) companies with roads under construction, (4) holding and financing companies. A second classification is according to income thus; (1) With $1,000,0000 gross annual income and over, (2) With gross annual income of $500,000, to $1,000,000, (3)

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The private compilation of street railway reports under the title "Street Railway Investments" seems to be complete and accurate so that it should be found the same useful reference for investors, and all interested in organization data that it has proven in earlier editions. For the benefit of the few to whom the book comes as a novelty it may be useful to state the sort of figures to be found in it. The arrangement of states and towns is alphabetical and following the name of the town, or city, the population is first given. The history of the particular company listed is then given in a half dozen lines, followed by equipment, capital stock, funded debt, dividends, parks and resorts, officers, directors, offices, traffic statistics, plants and shops, etc. Three pages of editorial matter, commenting on the value of publicity accounts, on effect of business depression, marked changes in great systems, etc., precede the pages of data.

Structural Specifications for Buildings.

GENERAL SPECIFICATIONS FOR STRUCTURAL WORK OF BUILDINGS.—By C. C. Schneider, M. Am. Soc. C. E. New York: The Engineering News Publishing Co. Paper; 6 × 9 ins.; pp. 68; four text illustrations; tables. 75 cts., net.

In 1905 Mr. Schneider presented to the American Society of Civil Engineers a paper on "The Structural Design of Buildings" which contained a set of specifications for the structural work of buildings, including in that work the loads that the building should support, the unit stresses of the various materials and the details of material and workmanship of the structural steel which should form the main framework of the structure. Appended to these specifications were a number of tables of weights and strengths of value to building designers and tabulated extracts from the building laws of various cities, comparing the different municipal requirements in buildings. The pamphlet which is noted above is a new edition of the specifications given by Mr. Schneider in his society paper brought down to date by some minor amendments and by the addition of some further tables of design, of drawings of standard columns and framing details and of a special chapter on concrete and reinforced concrete as applied to buildings.

The specifications on structural steel for buildings are about the same as have been standard now for some years and as such call for no criticism and little comment, further than to note that they are now available in compact form. The specifications for concrete are especially noteworthy as the presentation of the more conservative view of concrete design. It will be remembered that Mr. Schneider was chairman of the Joint Committee on Concrete and Reinforced Concrete which presented a "Progress Report" some two years ago and that he was one of the minority to vote against the report as finally adopted. It is to be presumed, then, that the specifications now printed under Mr. Schneider's name more properly express the ideas of that minority than did the aforesaid widely circulated report.

Study of Mr. Schneider's specifications will show that his conservatism is largely intentional rather than actual, and that a concrete structure designed under his provisions will differ but slightly from one designed under those of the Joint Committee. Excepting some of the most bold reinforced-concrete designers, probably no one will object very strenuously to the stresses that are allowed or to the very wise injunctions as to the care with which concrete work must be prosecuted and to the limits within which it is applicable. The one noticeable conservatism is the restriction of reinforced-concrete columns to those in which the reinforcement

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Gear Wheel Designing and Cutting.

AMERICAN MACHINIST GEAR BOOK.—Simplified Tables and Formulas for Designing, and Practical Points in Cutting All Commercial Types of Gears. By Charles H. Logue, Associate Editor "American Machinist." New York: McGraw-Hill Book Co. Cloth; 6¼ x 9¼ ins.; pp. 348; 302 text illustrations. $2.50, net.

The theory and practice of both the design and construction of gear wheels is here collected and compressed into one convenient and up-to-date volume. It is stated in the preface that the book is intended for "the man behind the machine"; but for a fair appreciation of its range, this must be taken to include not the machinist alone but also the machine designer. Besides assisting the machine-shop superintendent, the book will be of great use to any one who has only occasionally to design a train of gear wheels and does not wish to take the time to make an extensive research on the subject.

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AN ELEMENTARY TEXT-BOOK ON MECHANICAL DRAWING.—By John E. Jagger, M. Sc. (Vic.), Whit. Sch. London, England: Charles Griffin & Co., Ltd. Philadelphia, Pa.: J. B. Lippincott Co. Cloth; 7¼ x 10 ins.; pp. 251; 126 illustrations, mostly in the text. $3.50, net.

The value of this book to American draftsmen, and especially to students or beginners, is seriously diminished through the circumstance that it presents only English practice. The distinguishing feature is the large number of general machine details shown and the nature of the accompanying text.

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ETUDE SUR LES PISTOLETS AUTOMATIQUES.—By Commandant E. Niotan. Extrait de "La Revue de Armée Belge." Paper; 6 x 8¼ ins.; pp. 156; 17 folding plates; 28 text illustrations.

Some years ago (May 14, 1908, p. 546) we noted in review a report of a board of United States Army officers upon tests of revolvers and automatic pistols, in which a detailed account was given of a set of very severe tests on a number of automatic pistols suggested for use by the

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XX CENTURY SHEET METAL WORKER.—A Modern Treatise on Modern Sheet Metal Work. By H. Osborne. Chicago, Ill.: "The American Engineman." Cloth; 5¼ × 7¾ ins.; pp. 86; numerous text illustrations. Cloth, $1; paper, 60 cts.

In this volume are collected rules for the geometrical constructions necessary in laying out the ordinary work of a tinsmith. A few specific jobs such as chimney tops and saddles, are discussed in detail. Tables of dimensions are given for buckets, pans, etc., of desired capacities.

Publications Received.

BITUMINOUS COAL.—Production and Shipments in Pennsylvania, Maryland and West Virginia, 1909. New York: Bituminous Coal Trade Association (Henry S. Fleming, Secy.) Stiff paper; 7 × 10 ins.; pp. 95.

BULLETINS U. S. GEOLOGICAL SURVEY.—Geo. Otis Smith, Director. Washington, D. C.: Pub. Doc. Paper; 5¾ × 9 ins.

No. 425: The Explosibility of Coal Dust. By George S. Rice, with chapters by J. C. Frazer, Axel Larsen, Frank Haas, and Carl Scholz. Pp. 186; 23 plates and 28 text illustrations.

No. 427: Manganese Deposits of the United States, with sections on Foreign Deposits, Chemistry and Uses. By Edmund Cecil Harder. Pp. 298; two folding plates (maps), one in pocket; 30 text illustrations.

No. 430-H: Advance Chapter from Contributions to Economic Geology (Short Papers and Preliminary Reports) 1909. Part I.—Metals and Nonmetals, Except Fuels. Phosphates. By H. S. Gale, R. W. Richards, and Eliot Blackwelder. Pp. 99; 10 plates (9 maps); 7 illustrations (3 maps).

CLASSIFICATION OF OPERATING EXPENSES OF CARRIERS BY WATER.—As prescribed by the Interstate Commerce Commission (Edward A. Moseley, Secy.), in accordance with Section 20 of the Act to Regulate Commerce. First issue. Effective on Jan. 1, 1911. Washington, D. C.: Pub. Doc. Paper; 5½ × 8¾ ins.; pp. 37.

CLASSIFICATION OF OPERATING REVENUES OF CARRIERS BY WATER.—As prescribed by the Interstate Commerce Commission (Edward A. Moseley, Secy.), in accordance with Section 20 of the Act to Regulate Commerce. First issue. Effective on Jan. 1, 1911. Washington, D. C.: Pub. Doc. Paper; 5½ × 8¾ ins.; pp. 15.

THE COLORADO SCIENTIFIC SOCIETY PROCEEDINGS.—Vol. IX. Grinding Wheels, Grinding Machinery, Grinding. By C. H. Norton. Read at the meeting of the society May 7, 1910, by R. S. Rubincam. Denver, Colo.: The Society. Paper; 6 × 9¼ ins.; pp. 34; 15 illustrations.

COMPRESSED AIR.—Theory and Computations. By Elmo G. Harris, C. E., M. Am. Soc. C. E., Professor of Civil Engineering, Missouri School of Mines. New York and London (England): McGraw-Hill Book Co. Cloth; 6¼ × 9¼ ins.; pp. 123; 5 plates, 13 tables and 14 text illustrations; appendices. $1.50, net.

FACTORIES AND THEIR FIRE PROTECTION.—A Tract for Architects and Builders. By Franklin H. Wentworth. Reprinted from the "Architectural Record," N. Y. Drawings furnished by New England Factory Mutual Fire Insurance Companies' Laboratories. Boston, Mass.: National Fire Protection Association. Paper; 6 × 9 ins.; pp. 11; 10 illustrations. 5 cts. per copy.

FINAL REPORT OF THE MINING REGULATIONS COMMISSION (Transvaal Colony).—Jacob De Villiers, Minister of Mines. Vol. I. By F. E. T. Krause, L. L. D., M. L. A., Chairman; Charles Porter, M. D., Medical Officer of Health, Johannesburg, and Alexander Heymann, M. A., Consulting Analytical Chemist and Metallurgist. Pretoria, Transvaal: Pub. Doc. Paper; 8¼ × 13 ins.; pp. 337.

ILLINOIS BUREAU OF LABOR STATISTICS.—Annual Coal Report for the year 1909. (David Ross, Secy.) Springfield, Ill.: Pub. Doc. Cloth; 6 × 9 ins.; pp. 487; 13 illustrations.

ILLINOIS WATER SUPPLY ASSOCIATION.—Proceedings of the second meeting held at the University of Illinois, March 8-9, 1910. Urbana-Champaign, Ill.: The Society. Stiff paper; 6 × 9 ins.; pp. 218; 8 maps and 25 illustrations. 50 cts.

INDIANA ENGINEERING SOCIETY (Inc.)—Proceedings of the Society at the Annual Meeting, held at Indianapolis, Ind., Jan. 13-15, 1910. Indianapolis, Ind.: The Society (Chas. Brossmann, Secy.) Stiff paper; 6 × 9 ins.; pp. 398; one folding plate and numerous text illustrations. 50 cts.

INTERNATIONAL RAILWAY FUEL ASSOCIATION.—Proceedings of the Annual Convention held at Chicago, Ill., May 23-26, 1910. Chicago, Ill.: The Association (D. B. Sebastian, Secy.) Paper; 6 × 9 ins.; pp. 195; one folding plate and numerous text illustrations.

NEW YORK STATE DEPARTMENT OF LABOR.—Annual Report of the Commissioner of Labor, for the year ending Sept. 30, 1909. Transmitted to the Legislature Jan. 24, 1910, as part of the ninth report of the Department of Labor. Albany, N. Y.: State Department of Labor. Cloth; 5¾ × 9 ins.; pp. 319.

OPINIONS AND DECISIONS OF THE RAILROAD COMMISSION OF THE STATE OF WISCONSIN.—Vol. III., Oct. 16, 1908, to Aug. 3, 1909. Compiled by J. M. Winterbotham, Secy. Madison, Wis.: Pub. Doc. Cloth; 6 × 9 ins.; pp. 1040.

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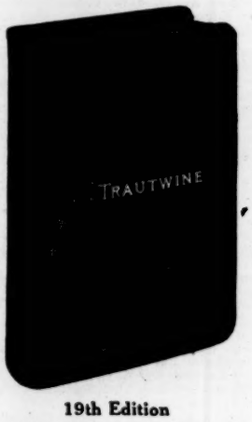

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